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ABSTRACT

Reported in this paper are the findings of five meta-analyses assessing the relationships among children's interpersonal cognitive problem-solving (ICPS) skills, training, and behavioral adjustment. Five hypotheses were examined: (1) Adjusted children score higher on ICPS measures than do nonadjusted children; (2) Children trained in ICPS skills demonstrate a higher level of ICPS skills at posttesting than do controls; (3) Teachers' posttest behavior ratings are more positive for trained children than for controls; (4) Social behaviors observed at posttesting are more positive for trained children than for controls; and (5) A direct relationship between increased ICPS skills and improvement in behavioral adjustment can be substantiated. Findings indicated that effects exist for the first three hypotheses. Magnitude of difference for the fourth and fifth hypotheses was not large, and the small magnitude of effect for the fifth hypothesis casts doubt on the application of the analytical theory. To extend the analysis, boundary conditions were investigated, and studies involving only special populations were examined. It was concluded that while the meta-analytical model and interventions delineated by Shure and Spivack (1979, 1980, 1982) do show reliable, if not always large, effects across studies, continued replication and refinement are needed. (RH)

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Interpersonal Cognitive Problem-Solving: A Meta-Analysis

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Running head: INTERPERSONAL COGNITIVE PROBLEM-SOLVING

Abstract

Children's interpersonal cognitive problem-solving skills may be related to their social adjustment; if so, specific interventions could increase both such skills and adjustment. Meta-analyses were performed to examine reported relationships between interpersonal cognitive problem-solving skills and adjustment, and reported effects of training. Boundary conditions were also examined.

Interpersonal Cognitive Problem Solving: A Meta-Analysis

Fostering social competence and behavioral adjustment has been a focus of many recent research efforts; psychologists have, through a variety of interventions, attempted to ameliorate, or even prevent, maladjustment. In one such line of research, investigators have demonstrated that there are distinct differences in the way adjusted and non-adjusted individuals conceptualize and solve interpersonal problems, from preschool age through adulthood (e.g., Spivack, Platt, & Shure, 1976).

The differences between adjusted and non-adjusted persons which appear in this research are evident for the following cognitive processes: (a) generation of numerous alternative solutions to interpersonal conflict situations; (b) adequate specification of particular means that may be necessary to achieve the chosen solution; and (c) consideration of the consequences of one's social acts, for oneself and others. It is the previously mentioned investigators' theoretical position that these interpersonal cognitive problem-solving (ICPS) skills are antecedent to, and thus mediate, social competence and behavioral adjustment.

For example, it is thought that a child who can formulate many alternative ways of dealing with others can be flexible, that one who plans his or her actions through

means-end thinking and can weigh pros and cons of the effects of diffferent interpersonal acts (consequential thinking) is less likely to make impulsive decisions and more likely to act appropriately in social situations (to the benefit of both parties). He/she also suffers less frustration through use of efficient interpersonal cognitive problem-solving. Simply put, socially competent behavior is seen as a direct function of these cognitive problem-solving processes.

Finding differences in these processes between adjusted and non-adjusted individuals was theoretically and practically encouraging. Such possible linkages between cognitive processes and behavior adjustment have motivated researchers to develop ICPS training programs designed to improve children's social competence whether children are at risk, behavior disordered, or "normal."

Further, extensive ICPS training studies have indicated that interventions based on teaching these specific skills to children increase not only these particular problem-solving skills, but also ratings of behavioral adjustment, for example, those made by teachers. In fact, Shure and Spivack have repeatedly demonstrated a direct linkage between increased interpersonal cognitive problem-solving skills and a positive change in behavior ratings (Shure & Spivack, 1979, 1980, 1982).

Many attempted replications and extensions of these findings have followed these reported successes; however, few have been as successful as those of the above group, in either substantiating the connection between ICPS skills and adjustment, or the salutary effects of training. Thus, despite a large body of research, questions remain regarding these two fundamental assertions.

A primary difficulty in arriving at unequivocal conclusions regarding these assertions arises from the question of how best to integrate findings from disparate age groups, outcome measures, and research designs. It would appear that meta-analytic techniques (see Glass, McGaw, & Smith, 1981) be helpful in integrating findings of studies within this domain, and in suggesting needed research.

A meta-analysis is a quantitative integration of the results of independent experiments. One begins a meta-analysis by systematically searching for all potentially relevant studies that are related for the following reasons: they share either a common conceptual hypothesis, the same methodology, and/or the same definition of independent and dependent variables. Meta-analysis results in a single set of numbers describing and evaluating the body of literature selected.

Thus the purpose of this paper is to report the findings of five meta-analyses assessing the relationship among ICPS skills, training, and behavioral adjustment. Five hypotheses, all directional, were examined by the meta-analyses performed. They are as follows:

(1) Adjusted children score higher on interpersonal cognitive problem-solving measures than non-adjusted children;

(2) Children trained in interpersonal cognitive problem-solving skills demonstrate a higher level of these skills at post-test than do no-treatment controls;

(3) Teachers' post-test behavior ratings for trained children are more positive than those for control children;

(4) Social behaviors which are observed at post-test are more positive for trained than control children; and

(5) A direct relationship between increased ICPS skills and improvement in behavioral adjustment can be substantiated.

Method

A large number of studies were identified for possible inclusion in the meta-analyses. Following previously listed guidelines, the independent and/or dependent variables, as well as conceptual premise, had to be similar to those used in Spivack and Shure's research in order for a study to be included here. In addition,

any study meeting the above criteria was included if its dependent variables were based on naturalistic behavior observations or simulations. Although few studies of interpersonal cognitive problem-solving include such behavioral validation, it is vital to evaluating both the theory and its applications. Moreover, studies were included only if subjects were in early or middle childhood.

Procedure

The analyses performed for each hypothesis included meta-analytic statistics and procedures as follows (see Cooper, 1979):

(1) Stouffer's z, an unweighted or weighted combination of probabilities involving the retrieval of the z-scores corresponding to the calculated p level for each effect examined. The p for the overall Stouffer z describes the likelihood that results could have been generated by chance; that is, it describes the confidence with which we can state that an effect exists.

(2) Failsafe number (Rosenthal, 1978, 1979), which is the number of studies with non-significant findings (hence, kept in one's file drawer!) that would be needed to reverse a conclusion that an effect does indeed exist.

This is more or less a bench mark which also allows one to compare the strength of effect exhibited against completeness of reviewer's sampling procedure.

(3) $\underline{d}$ index, which tells how far apart the means of two groups, experimental and control, are in terms of their common standard deviation, independent of sample size.

(4) $\underline{U}_3$, an index which describes the same quality as does the $\underline{d}$ index, but with more intuitive appeal, was calculated for each study. $\underline{U}_3$ tells by what percentage the smaller-meaned group is exceed by the average person in the larger-meaned group. This index is derived directly from $\underline{d}$ (Cohen, 1977).

(5) Lastly, N_n (Vecchio, 1983) was calculated for each hypothesis to guard against Type I error. This index is essentially a comparison point for the Failsafe N. If the failsafe number is less than or equal to this index ($5n_s + 10$), we know we are in danger of rejecting a true H_0 if we assert that an effect exists.

Results

A summary of the results of the five meta-analyses can be seen on Table 1; more detailed results appear in Tables 2-6.

The meta-analysis examining the first hypothesis, that adjusted children score higher on ICPS measures than non-adjusted children, revealed a highly significant

Stouffer $\underline{z}$ and a large Failsafe N. Thus we can say that this effect does exist, and by referencing the effect size (d = .72) and $\underline{U}_3$, we can say that the effect is large in practical terms. That is, the average adjusted child scored higher than the 75th percentile of the non-adjusted group. We can therefore say that scores on ICPS measures do differentiate between adjusted and non-adjusted children.

The meta-analytic results for the second hypothesis, that training increases ICPS skills, indicate that this effect does exist (see Stouffer's $\underline{z}$ and Failsafe N), and is large enough to be of practical significance. It appears safe to conclude that trained children do exhibit significantly more ICPS skills at post-test than control children. To this extent training is effective.

The meta-analysis of results of studies which examine the impact of training on teachers' behavior rating reveals that the effect (that trained children are rated higher than control children at post-test) does exist. However, the Failsafe N computed indicates the possibility of a file-drawer effect; it is also telling the calculated reference index is larger than the Failsafe N. Further, the magnitude of the effect, as evidenced by the $\underline{d}$ index and $\underline{U}_3$, is small. Overall, these findings indicate that caution should be used in assuming that the behavior of

children trained in ICPS skills will be more favorably rated by teachers than the behavior of untrained children.

The results of the meta-analysis investigating the hypothesis that the observed behaviors of trained children are more positive than those of control children indicates that there is a reliable difference between these two groups (see Stouffer $\underline{z}$ and Failsafe N). However, the magnitude of the difference between trained and control groups is not large, and the Failsafe N is not as convincing as those for H_1 and H_2 (N_n is close to it, as well).

Findings for the final hypothesis indicate that an increase in ICPS skills is reliably paired with improvement in rated behavioral adjustment. The practical magnitude of this effect is, however, not large. In essence, the small magnitude of this particular effect casts further doubt on the application of this theory.

Boundary Conditions

The above results, while enlightening, describe main effects only; they summarize the body of literature involving ICPS in children. It may be, however, that interactions within these main effects exists, such as relationships between effect sizes and study characteristics. With this possibility in mind, age, specific ICPS measures, source of investigation, length of

intervention, normal/aberrant subject classification, and type of intervention were examined to determine whether they exerted an effect on d indices in the various hypotheses (see Table 7 for boundary effects results).

It does appear that a larger effect of training is seen where alternative generation (rather than consequential or means-end thinking) is measured, as shown by protected t-tests. Age, however, exerts no main effect on d indices, and there is no Age X Type of Skill (e.g., alternative thinking, means-end, consequential) interaction.

Source of investigation is a highly significant boundary condition ($p < .01$) for the question of whether ICPS skills are generally related to adjustment; the Spivack/Shure group has been most likely to obtain positive findings. For H_2, whether training positively effects ICPS skill, Spivack and Shure group findings are greater than those of all groups except researchers from the University of Rochester.

No other study characteristics were significant boundary conditions. It would seem important, however, to more specifically investigate, in future research, the effect of length and type of intervention, and whether aberrant students profit more from training than do normal ones. Aggregation of the few studies that address these

issues shows effects which approach significance. Longer training generally effects teachers' behavior ratings positively, for many possible reasons due to various curriculum components.

Lastly, a small subset of studies involving only special populations was examined (e.g., learning disabled, retarded, emotionally disturbed students) While average effect sizes which were retrievable closely mirror findings for the five meta-analyses discussed here, sample size was small in these studies, quality was questionable, and variability of effect size was extremely high. Some of the better research of this genre, however, finds that interpersonal cognitive problem-solving training merely "loosens the tongues" behavior disordered students (Camp, Blom, Herbert, & VanDoorninck, 1977; Sharp, 1981). They give many alternatives, but quite aggressive ones. Thus, closer investigation of the application of interpersonal cognitive problem-solving training for special populations, as well as specification of needed modifications for such populations, is necesary.

Implications and Conclusions

The five meta-anlyses performed here indicate that, in general, the model and interventions delineated by Shure and Spivack do show reliable effects across studies. These effects are, however, not always large, especially

regarding the effects of ICPS training on rated or observed behavior adjustment variables. As these are presumably the "bottom line" questions for both the theory and its applications, continued replication and refinement is necessary.

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Table 1

Summary Statistics: Interpersonal Cognitive Problem-solving Meta-analyses

Meta-analysis	N study	Stouffer's z	p	Weighted z	p	Fail-safe no.	Mean effect	U3
ICPS/ adjustment	11	6.89	.000	7.15	.000	182.46[a] (65)	0.72[b] (0.63)	74.7%
Training/ ICPS skills	18	10.50	.000	9.56	.000	716.10 (95)	0.75 (0.58)	75.0%
Training/ beh.rating	6	2.99	.001	4.58	.000	13.80 (40)	0.21 (0.43)	58.0%
Training/ beh. obs.	6	5.93	.000	3.11	.001	71.91 (40)	0.43 (0.28)	66.1%
Direct mediation	8	5.54	.000	4.61	.000	82.86 (50)	0.47 (0.29)	66.9%

a N (Vecchio, 1983)

b n sigma d

Table 2

Meta-analysis One

Problem-Solving Scores of Adjusted and Non-Adjusted Children

Author	Year	N	One-tailed p	z	d	U_3 (%)	Direction[a]
Enright et al.	1980	40	.05	1.64	0.58	71.9	+
Gillespie et al.	1982	32	.113	-1.21	-0.28	61.0	-
McKim et al.	1982	67	.0125	3.03	0.61	72.9	+
Pellegrini	1980	100	.00025	3.48	0.85	80.2	+
Rickel & Burgio	1982	95	.125	1.15	0.16	56.3	ns
Sharp	1981	107	.425	0.19	0.29	61.4	+
Shure et al.	1973	257	.00025	3.48	1.32	90.6	+
Shure & Spivack	1972	108	.00025	3.48	1.77	96.1	+
Shure & Spivack	1982	113	.00025	3.48	1.43	92.3	+
Shure et al.	1971	62	.00025	3.48	1.02	84.6	+
Swanson & Siegel	1980	22	.250	0.68	0.12	54.8	+

(table continued)

[a]
Direction: + = consistent with hypothesis

ns = non-significant difference between groups

\- = not consistent with hypothesis

Table 3

Meta-analysis Two

Effect of Training on Children's Problem-Solving Skills

Author	Year	N	One-tailed p	z	d	U_3 (%)	Direction[a]
Allen	1976	119	.00025	3.48	0.86	80.5	+
Bensky	1978	36	.125	-1.15	-0.15	44.0	-
Elias	1980	158	.00025	3.48	1.03	84.8	+
Enright	1980	24	.05	1.64	0.56	71.2	+
Enright	1980	38	.05	1.64	0.45	67.3	+
Gesten et al.	1982	133	.00025	3.48	0.64	73.9	+
Houtz & Feldhusen	1976	135	.0025	2.81	0.53	70.2	+
McClure et al.	1978	89	.50	0.00	0.05	52.0	ns
Poitras-Martin et al.	1977	20	.05	1.64	0.58	71.9	+
Rickel et al.	1983	54	.0375	1.78	0.41	65.9	+
Sharp	1980	54	.08	1.41	0.36	62.0	+
Shure & Spivack	1975	235	.00025	3.48	0.54	70.5	+
Shure & Spivack	1977	40	.00025	3.48	1.51	93.4	+

(table continued)

Author	Year	N	One-tailed p	z	d	U_3 (%)	Direction[a]
Shure & Spivack	1980	219	.00025	3.48	1.00	84.1	+
Shure et al.	1972	94	.00025	3.48	2.00	97.7	+
Stone et al.	1975	144	.00025	3.48	0.70	75.8	+
Weissberg et al.	1981	563	.00025	3.48	1.95	97.4	+
Weissberg et al.	1981	243	.00025	3.48	0.50	69.1	+

[a] Direction: + = consistent with hypothesis

ns = non-significant difference between groups

\- = not consistent with hypothesis

Table 4

Meta-analysis Three

Effect of Training on Teacher's Ratings of Behavior

Author	Year	N	One-tailed p	z	d	U_3 (%)	Direction[a]
Elias	1980	53	.125	-1.15	-0.15	44.0	-
Gesten et al.	1982	133	.0125	-2.24	-0.43	33.4	+
Sharp	1981	35	.125	1.15	0.19	57.5	ns
Shure & Spivack	1982	219	.005	2.60	0.45	67.3	+
Weissberg et al.	1981	563	.00025	3.48	0.68	75.2	+
Weissberg et al.	1981	243	.00025	3.48	0.55	70.0	+

[a] Direction: + = consistent with hypothesis

ns = non-significant difference between groups

- = not consistent with hypothesis

Table 5

Effect of Training on Observational Ratings

Author	Year	N	One-tailed p	z	d	U3 (%)	Direction[a]
Gesten et al.	1982	261	.00025	3.48	0.87	80.8	+
McClure et al.	1978	185	.025	1.96	0.38	64.8	+
Rickel et al.	1983	54	.75	1.44	0.33	63.8	+
Sharp	1979	107	.25	0.68	0.00	50.0	ns
Weissberg et al.	1981	563	.000025	3.48	0.49	68.7	+
Weissberg et al.	1981	243	.00025	3.48	0.49	68.7	+

[a] Direction: + = consistent with hypothesis

ns = non-significant difference between groups

- = not consistent with hypothesis

Table 6

Meta-analysis Five

Relationship Between Change in Problem-Solving Skills and Change In Behavioral Adjustment

Author	Year	N	One-tailed p	z	d	U_3 (%)	Direction[a]
Elias	1980	151	.0125	2.24	0.35	63.7	+
Gesten	1982	25	.10	1.28	0.47	66.9	ns
McClure et al.	1978	185	.025	1.96	0.38	64.8	+
Sharp	1981	15	.10	1.28	0.55	67.3	+
Shure & Spivack	1977	17	.025	1.96	0.94	82.6	+
Shure & Spivack	1982	92	.00025	3.48	0.75	77.3	+
Weissberg et al.	1981	563	.00025	3.48	0.32	62.5	+
Weissberg et al.	1981	243	.50	0.00	0.00	50.0	ns

[a] Direction: + = consistent with hypothesis

ns = non-significant difference between groups

- = not consistent with hypothesis

Table 7

Summary Statistics: Boundary Conditions

Condition	N study	d	d s.d.	F
AGE				
H_1				
Early	9	0.77	0.62	0.009
Late	2	0.73	0.17	
H_2				
Early	8	0.85	0.60	0.443
Late	10	0.67	0.57	
H_3, H_4, H_5				
Early	9	0.41	0.32	0.216
Late	13	0.39	0.35	
DEPENDENT MEASURE				
H_2				**
Alternative	17	0.93	0.54	3.43
Consequential	6	0.32	0.60	
Means-End	5	0.49	0.48	
SOURCE				
H_1				***
Hahnemann	4	1.38	0.29	6.99
Detroit	3	0.19	0.08	

(table continued)

Condition	N study	d	d ad	F
Rochester		0.61	0.37	
Other	3	0.38	0.59	
SOURCE				
H_2				
Hahnemann	4	1.26	0.63	1.92
Detroit	2	0.39	0.03	
Rochester	3	1.03	0.80	
UConn	4	0.48	0.58	
Other	5	0.56	0.09	
H_3, H_4, H_5				
Hahnemann	3	0.71	0.28	1.47
Detroit	4	0.28	0.23	
Rochester	9	0.38	0.3[illegible]	
UConn	4	0.24	0.26	
SUBJECTS				
H_2				
Aberrant	4	1.55	0.92	1.42
Adjusted	4	0.67	1.16	

(table continued)

Condition	N study	d	d sd	F
LENGTH OF TRAINING				
H 2				
Long	9	0.98	0.67	2.90 *
Short	7	0.49	0.40	
H 3				
Long	4	0.64	0.18	33.28 ****
Short	2	-0.29	0.20	

* p < .11
** p < .05
*** p < .01
**** p < .004